FORM PTO-1390 (REV. 11-2000) U S DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER	
0475-0198P	
U.S. APPLICATION NO. (If known, see 37 CFR 1.5)	
10/009603 NEW	

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/EP00/05418	June 13, 2000	June 11, 1999

TITLE OF INVENTION
SUPPORT MATERIALS AND IMAGING METHOD FOR INTRAORAL DIAGNOSTIC PURPOSES

APPLICANT(S) FOR DO/EO/US
GASSER, Oswald; GUGGENBERGER, Rainer; GANGNUS, Bernd; HABERLEIN, Ingo

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39 (1).
4. ☒ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau). WO 01/12237 A1
   b. ☐ has been transmitted by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
   a. ☒ is transmitted herewith.
   b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4)
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)).
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☒ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 20. below concern document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98, Form PTO-1449(s), and International Search Report (PCT/ISA/210) with 14 cited document(s).
12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A FIRST preliminary amendment.
14. ☐ A SECOND or SUBSEQUENT preliminary amendment.
15. ☐ A substitute specification.
16. ☐ A change of power of attorney and/or address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821-1.825.
18. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. ☒ Other items or information:
    1.) International Preliminary Examination Report (PCT/IPEA/409)
    2.) European Search Report
    3.) One Additional Copy of the English Language Translation of the International Application w/. Certificate of Translation
    4.) Zero (0) Sheets of Formal Drawings

JG07 Rec'd PCT/PTO 11 DEC 2001

U.S. APPLICATION NO (if known, see 37 CFR 1.5)	INTERNATIONAL APPLICATION NO	ATTORNEY'S DOCKET NUMBER
NEW 10/009603	PCT/EP00/05418	0475-0198P

21. ☒ The following fees are submitted:	CALCULATIONS	PTO USE ONLY
BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5):		
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO. **$1,040.00**		
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO **$890.00**		
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO. **$740.00**		
International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) **$710.00**		
International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4). **$100.00**		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ **890.00**	
Surcharge of **$130.00** for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(e)).	$ **0.00**	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total Claims	18 - 20 =	0	X **$18.00**	$ **0.00**	
Independent Claims	3 - 3 =	0	X **$84.00**	$ **0.00**	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)		Yes	+ **$280.00**	$ **280.00**	
			TOTAL OF ABOVE CALCULATIONS =	$ **1,170.00**	
☐ Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				$ **0.00**	
			SUBTOTAL =	$ **1,170.00**	
Processing fee of **$130.00** for furnishing the English translation later than ☐20 ☐30 months from the earliest claimed priority date (37 CFR 1.492(f)). +				$ **0.00**	
			TOTAL NATIONAL FEE =	$ **1,170.00**	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property +				$ **40.00**	
			TOTAL FEES ENCLOSED =	$ **1,210.00**	
				Amount to be: refunded	$
				charged	$

a. ☒ A check in the amount of $ **1,210.00** to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account. No. _____ in the amount of $_____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 02-2448.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

Send all correspondence to:
Birch, Stewart, Kolasch & Birch, LLP or Customer No. 2292
P.O. Box 747
Falls Church, VA 22040-0747
(703) 205-8000

Date: December 11, 2001

By _____
Andrew D. Meikle, #32,868

/rem

PATENT
0475-0198P

IN THE U.S. PATENT AND TRADEMARK OFFICE

Applicant:	GASSER, Oswald et al.		
Int'l. Appl. No.:	PCT/EP00/05418		
Appl. No.:	New	Group:	
Filed:	December 11, 2001	Examiner:	
For:	SUPPORT MATERIALS AND IMAGING METHOD FOR INTRAORAL DIAGNOSTIC PURPOSES		

PRELIMINARY AMENDMENT

BOX PATENT APPLICATION
Assistant Commissioner for Patents
Washington, DC 20231

December 11, 2001

Sir:

The following Preliminary Amendments and Remarks are respectfully submitted in connection with the above-identified application.

AMENDMENTS

IN THE SPECIFICATION:

Please amend the specification as follows:

Before line 1, insert --This application is the national phase under 35 U.S.C. § 371 of PCT International Application No. PCT/EP00/05418 which has an International filing date of June 13, 2000, which designated the United States of America.--

IN THE CLAIM:

Please amend the claims as follows:

4. (Amended) Support material according to claim 1, characterized in that at least enough diagnostic additives are contained to enable a diagnostic signal to be observed.

5. (Amended) Support material according to claim 1, characterized in that the diagnostic additives are contained in a quantity of 0.0001 to 10 wt.-%, preferably 0.01 to 1 wt.-%.

6. (Amended) Support material for use according to claim 1, characterized in that it is selected from one of the following groups:

(i) impression materials or films based on silicon, polyether-silicon, polyether, alginate or hydrocolloid,

(ii) plastics from the group polyethylenes, polypropylenes, poly(meth)acrylates, polyurethanes, polycarbonates, polysulphide, polyvinylchlorides or rubber,

(iii) hydrogels based on polyvinylpyrrolidone or polyvinylalcohol, or

(iv) dental plaster preparations.

12. (Amended) Process according to claim 11, characterized
in that the diagnostically useful additives are used in a quantity of 0.0001 to 10 wt.-%,

preferably 0.01 to 1 wt.-%.

13. (Amended) Process according to claim 12, characterized in that the support material is selected from one of the following groups:

(i) impression materials or films based on silicon, polyether-silicon, polyether, alginate or hydrocolloid,

(ii) plastics from the group polyethylenes, polypropylenes, poly(meth)acrylates, polyurethanes, polycarbonates, polysulphide, polyvinylchlorides or rubber.

(iii)hydrogels based on polyvinylpyrrolidone or polyvinylalcohol, or

(iv) dental plaster preparations.

REMARKS

The specification has been amended to provide a cross-reference to the previously filed International Application.

The claims have amended to delete improper multiple dependencies.

Entry of the above amendments is earnestly solicited. An early and favorable first action on the merits is earnestly solicited.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By _____
Andrew D. Meikle, #32,868

P.O. Box 747
Falls Church, VA 22040-0747
(703) 205-8000

ADM/rem
0475-0198P

Attachment: VERSION WITH MARKINGS TO SHOW CHANGES MADE

VERSION WITH MARKINGS TO SHOW CHANGES MADE

The specification has been amended to provide a cross-reference to the previously filed International Application.

IN THE CLAIMS:

The claims have been amended as follows:

4. (Amended) Support material according to [any one of Claims 1 to 3] claim 1, characterized in that at least enough diagnostic additives are contained to enable a diagnostic signal to be observed.

5. (Amended) Support material according to [any one of Claims 1 to 4] claim 1, characterized in that the diagnostic additives are contained in a quantity of 0.0001 to 10 wt.-%, preferably 0.01 to 1 wt.-%.

6. (Amended) Support material for use according to [any one of Claims 1 to 5] claim 1, characterized in that it is selected from one of the following groups:

(i) impression materials or films based on silicon, polyether-silicon, polyether, alginate or hydrocolloid,

(ii) plastics from the group polyethylenes, polypropylenes, poly(meth)acrylates, polyurethanes, polycarbonates, polysulphide, polyvinylchlorides or rubber,

(iii) hydrogels based on polyvinylpyrrolidone or polyvinylalcohol, or

(iv) dental plaster preparations.

12. (Amended) Process according to [any one of Claims 9 to 11] claim 9, characterized in that the diagnostically useful additives
are used in a quantity of 0.0001 to 10 wt.-%, preferably 0.01 to 1 wt.-%.

13. (Amended) Process according to [any one of Claims 9 to 12] claim 9, characterized in that the support material is selected from one of the following groups:

(i) impression materials or films based on silicon, polyether-silicon, polyether, alginate or hydrocolloid,

(ii) plastics from the group polyethylenes, polypropylenes, poly(meth)acrylates, polyurethanes, polycarbonates, polysulphide, polyvinylchlorides or rubber.

(iii)hydrogels based on polyvinylpyrrolidone or polyvinylalcohol, or

(iv) dental plaster preparations.

Support material and imaging method for intraoral diagnostic purposes

The invention relates to deformable, curable or film-forming support materials which contain diagnostically useful additives for intraoral diagnostics. Furthermore, the invention relates to a process for the preparation of images for intraoral locus- and substance-specific diagnostic purposes as well as a process for the multiple and locus- and substance-specific investigation using the curable or film-forming support materials containing diagnostically useful additives. Such additives make it possible for the person skilled in the art to prepare images for intraoral locus- and substance-specific detection of pathogenic substances and/or of microorganisms or for intraoral locus- and substance-specific detection of substances which indicate mouth diseases or healing processes.

The invention relates in particular to dental impression materials for intraoral diagnostics, which contain diagnostically useful additives as well as a process for the application of diagnostically useful additives to cured impression materials, the diagnostically useful additives being suitable for intraoral locus- and substance-specific detection of pathogenic substances and/or of microorganisms or for intraoral locus- and substance-specific detection of substances which indicate mouth diseases or healing processes.

The invention also relates to deformable or curable or film-forming support materials, in particular dental impression materials which can locus-specifically absorb intraoral substances, these absorbed intraoral substances allowing the person skilled in the art to carry out test processes by applying diagnostically effective additives to the support materials which are suitable for intraoral locus- and substance-specific detection of pathogenic substances and/or of microorganisms, or for intraoral locus- and substance-specific detection of substances which indicate mouth diseases or healing processes.

The locus- and substance-specific detection of substances in the oral environment is a problem which has been worked on for a long time. Single-site tests are known to the person skilled in the art (e.g. EP-A-0 304 871), all

of which are based on taking individual samples from definite points in the oral cavity, for example gingival pockets, the surfaces of teeth or root canals of teeth. Subsequent analysis of these samples is carried out using very widely varying methods, depending on the question asked, and a distinction should be made between four general approaches:

1. The microbiological investigation often takes place after the samples have been incubated for several days in suitable culture media because the number of microorganisms originally present is not sufficient for a direct investigation. After the microorganisms have been multiplied the Colony-Forming-Units (CFU) are counted and the number of microorganisms present in the sample monitored (Kneist, S.; Klein, C.; Rupf, S.; Eschrich, K. Quintessenz (1999) 50, 33-43). The vital microorganisms present in the sample can multiply under optimal conditions in these test systems. The examination result thus indicates the maximum possible pathogenic potential of the evaluated microorganisms, if the microorganisms selectively attracted by definite culture media could multiply unhindered in the same way in the oral cavity.

   However it is known that precisely such optimum growth conditions are not present in the oral cavity, so that the test result is therefore only conditionally meaningful.

   Moreover, it must not be overlooked that a culture of pathogenic microorganisms is started by incubation of the samples which have to be treated in practice with corresponding precautionary measures to minimise risk. Special disposal is necessary. Along with these disadvantages the incubation method for microbiological investigation is expensive and very time-consuming.

2. Immunological methods provide a further general approach to microbiological investigation in Single-Site-Tests. In these methods monoclonal or polyclonal antibodies are used against surface structures

or separated substances of microorganisms. Moreover inflammation processes can also be followed with corresponding antibodies for example. Reference can be made, for example, to WO-94/12877, US-5 665 559, WO-96/07103 and WO-96/32647.

In comparison to the incubation methods according to paragraph 1, the immunological methods according to paragraph 2 are more specific, faster and more economical. However they have distinct weaknesses with regard to reproducibility, caused, amongst other things, by the sample taken. For example, not only vital, but also considerable quantities of dead microorganisms are to be found in one plaque region. Depending on the sample taken, the ratio of dead to vital microorganisms can be different. As the antibodies cannot distinguish between vital and dead microorganisms, an unpredictable range of variation results in deduction of the existing pathogenic potential of the evaluated microorganisms (Aass, A.M.; Preus, H.R., Zambon, J.J., Gjermo, P. Scand J. Dent Res (1994) 102, 355-360).

3. The method with the highest sensitivity is based on Poly-Chain-Reaction technology (PCR). The smallest amounts of microorganisms can be detected with high specificity. However the PCR technology is time-consuming, complex, expensive and not simple to control (Rupf, S., Kneist, S.; Merte, K.; Eschrich, K. Eur. J. Oral. Sci (1999) 107, 75-81).

4. Some further methods have been described which use biochemical markers in order to diagnose mouth diseases. The contribution from J. Meyle, Deutsche Zahnärztliche Zeitschrift (1999) 54, 73-77) offers an overview. The meaningfulness of individual biochemical markers must be assessed discriminatively, taking clinical studies into consideration, and remains the preserve of the person skilled in the art. It must be stressed that determination by biochemical markers takes place using Single-Site methods. Reference is made for example to Patent Specification WO-98/21583. The auxiliary tools necessary here are characterized in that they bind the samples to be examined (WO-91/14000, EP-A-0 304 871,

US-A-5 725 373). For each sample site one auxiliary tool has to be used and analysed individually.

In principle, all Single-Site methods known from the state of the art have the decisive disadvantage that an approximately complete description of the situation in the oral cavity can only be gained with a large number of individual samples. Paper swabs are frequently used for sampling, as these can be inserted into gingival pockets or root canals (US-A-5 725 373, EP-A-0 304 871).

It is known that the parodontitis activity from one gingival pocket to another in a patient can be very different, although the parodontitis exciter is located ubiquitously in the gingival pockets. Far more than 25 individual samples therefore have to be taken for one investigation and examined without it being possible to be sure that one or other focus of parodontitis does not remain unconsidered.

In principle, this shows that spot checks only allow unsatisfactory descriptions of the situation in the oral cavity. The time-consuming and expensive nature of single-site techniques can thus be only partly justified, and consequently single-site techniques have not found wide application in oral-cavity diagnostics.

For a long time there has therefore been an urgent need to make available a simple and economical process for simultaneous multiple as well as locus- and substance-specific intraoral investigation in the oral cavity.

The object of the present invention is to provide agents and methods for intraoral locus- and substance-specific, and at the same time, multiple detection of pathogenic substances and/or of microorganisms or of intraoral locus- and substance-specific detection of substances, which indicate mouth diseases or healing processes.

In the course of the description of the invention by pathogenic substances and/or microorganisms to be detected, or substances which indicate mouth diseases or healing processes is meant, for example, the following:

1. Metabolic products of bacteria, viruses or fungi, for example antigens, lipids, proteins, peptides, polysaccharides, DNA, RNA, sugars, amino acids, carboxylic acid, for example lactic acid and propionic acid, as well as other low molecular, anionic, cationic or neutral substances and combinations of these, which result for example from ionic, polar, nonpolar, hydrophobic, covalent or adhesive interactions.

2. Surface structures of bacteria, viruses or fungi, consisting for example of antigens, lipids, proteins, peptides, polysaccharides, DNA, RNA, sugars, amino acids or other low molecular, anionic, cationic or neutral substances and combinations of these, which result for example from ionic, polar, nonpolar, hydrophobic, covalent or adhesive interactions.

3. Human or animal substances which are formed in response to infections by bacteria, viruses or fungi, consisting for example of antibodies, antigens, lipids, proteins, peptides, polysaccharides, DNA, RNA, sugars, amino acids or other low molecular, anionic, cationic or neutral substances and combinations of these, which result for example from ionic, polar, nonpolar, hydrophobic, covalent or adhesive interactions.

4. Human or animal substances, which indicate mouth disease which are not caused *a priori* by a bacterial, virus or fungus infection (for example, cancers) consisting for example of antibodies, antigens, lipids, proteins, peptides, polysaccharides, DNA, RNA, sugars, amino acids or other low molecular, anionic, cationic or neutral substances and combinations of these, which result for example from ionic, polar, nonpolar, hydrophobic, covalent or adhesive interactions.

5. Substances which are found in structures which are known to be the result of or the precondition for the occurrence of mouth diseases, for

example plaque or biofilm, consisting for example of antibodies, antigens, lipids, proteins, peptides, polysaccharides, DNA, RNA, sugars, amino acids or other low molecular, anionic, cationic or neutral substances and combinations of these, which result for example from ionic, polar, nonpolar, hydrophobic, covalent or adhesive interactions.

6. Substances which indicate current healing processes, which are known to be the result of oral diseases or injuries, for example tissue and/or bone regeneration, consisting for example of antibodies, antigens, lipids, proteins, peptides, polysaccharides, DNA, RNA, sugars, amino acids or other low molecular, anionic, cationic or neutral substances and combinations of these, which result for example from ionic, polar, nonpolar, hydrophobic, covalent or adhesive interactions.

The substances listed above are examples of such substances which can be used alone or in combination for the purpose of diagnosing intraoral diseases and are described below as marker compounds.

According to the invention the object described is achieved by deformable, curable or film-forming support materials, which bind/absorb marker compounds, so that the diagnosis takes place for example on or in the support material. The invention relates to deformable, curable or film-forming support material, which is characterized in that it contains additives diagnostically useful for the locus- and substance-specific intraoral diagnosis which lead to a diagnostic result without a cultivation step. The diagnostically useful additives are used in particular for intraoral locus-specific detection of pathogenic substances and/or of micro organisms or for intraoral locus-specific detection of substances which indicate mouth diseases or healing processes. The additives can be present in microcapsulated form. The support materials should contain at least enough diagnostic additives for a diagnostic signal to be observed.

The invention further relates to a process for the preparation of images for intraoral locus- and substance-specific diagnostic purposes, which is

characterized in that diagnostically useful additives are applied to deformable, curable or film-forming support materials that contain no diagnostically useful additives, in such a quantity that a diagnostic signal can be observed, the additives leading to a diagnostic result without a cultivation step.

The invention also relates to processes for simultaneous multiple as well as locus- and substance-specific intraoral investigation, including the steps: Taking of impression with deformable, curable or film-forming support material, which contains diagnostically effective additives, and possibly application of further diagnostically effective additives, or taking of impression with deformable, curable or film-forming support material, which contains no diagnostically effective additives, and application of diagnostically effective additives.

The diagnostically useful additives which can be used according to the invention are partly commercially available and can if necessary be physically, chemically, biochemically or genetically modified; this also applies in particular to enzymes and their substrates, to antibodies and their antigens and to oligonucleotides and polynucleotides.

The diagnostically useful additives allow the person skilled in the art to carry out diagnostic test processes which are suitable for intraoral locus- and substance-specific detection of pathogenic substances and/or of microorganisms, or which are suitable for intraoral locus- or substance-specific detection of substances which indicate mouth diseases or healing processes.

The mouth diseases which can be diagnosed include caries, early onset parodontitis, prepubertal parodontitis, juvenile parodontitis, rapid progressive parodontitis (RPP), adult parodontitis, refractory parodontitis, gingivitis, halitosis, infections with Candida albicans, Candida krusei, Candida glabrata, Candida iusitaniae, Candida dubliniensis and cancer.

Bacteria can be located in gingival pockets which release the sulphur found in cysteine or methionine in the form of volatile sulphur compounds such as mercaptans or hydrogen sulphide. Dissimilation active sulphate-reducing bacteria are known, whose hydrogen sulphide formation is correlated with sulphate reduction. By use of the support materials according to the invention and application of the process according to the invention, the rate of formation of hydrogen sulphide and mercaptans, preferably methyl mercaptans, can be measured in gingival pockets. Moreover, the bacterial enzyme activities, preferably methionin-γ-lyase, particularly preferably cysteine desulfhydrase, which catalyse the formation of the volatile sulphur compounds, can be used as a measure of halitosis activity in gingival pockets. Moreover the presence of the bacteria responsible for the release, preferably fusobacteria, Porphyromonas, Veillonella, Clostridium and Treponema, can be determined with polyclonal antibodies and their subclasses or monoclonal antibodies.

The different forms of parodontitis are causally connected with infection by Actinobacillus actinomycetemcomitans, Bacterioides forsythus, Campylobacter rectus, Capnocytophage ochracea, Capnocytophage gingivalis, Eikenella corrodens, Fusobacterium nucleatum, Porphyromonas asaccharolyticus, Porphyromonas gingivalis, Prevotella dentalis, Prevotella intermedia, Prevotella nigrescens and Treponema denticola. By use of the support materials according to the invention and application of the process according to the invention, the presence and quantity of bacteria in the sulcus fluid can be determined. Specific polyclonal antibodies and their subclasses or monoclonal antibodies which are directed against surface antigens of these bacteria, for example fimbriae, extra-cellular polysaccharides and adhesins are suitable for this purpose.

By use of the support materials according to the invention and application of the process according to the invention, enzyme activities can be measured in the sulcus fluid, indicating the presence and metabolic activity of a bacterium or a group of the named bacteria. Trypsin-like protease activity, preferably dipeptidyl peptidase activity, particularly preferably Arg-Gingipain activity and

Lys-Gingipain activity, is used diagnostically. Synthetic peptides which contain at least one Arg radical (in P1 position) next to the detectable parting group can be used to determine Arg-Gingipain activity. Synthetic peptides which contain at least one Lys radical (in P1 position) next to the detectable parting group can be used for determining the Lys-Gingipain activity. Besides p-nitroaniline derivatives, for example Nα-benzoyl-DL-arginine-p-nitroanilide, and 2-naphthylamine-peptide derivatives, for example Nα-benzoyl-DL-arginine-β-naphthylamide, 6-aminoquinoline-peptide derivatives, rhodamine-peptide derivatives and coumarin-peptide derivative, for example 7-amido-4-methylcoumarin, such as N-t-Boc-Val-Pro-Arg-7-amido-4-methylcoumarin and 7-amino-4-chloromethylcoumarin, such as N-t-Boc-Val-Pro-Arg-7-amido-4-chloromethylcoumarin can be used as detectable parting groups.

By use of the support materials according to the invention and application of the process according to the invention the bacterial substances which lead to induction of cytokines can be diagnosed with polyclonal antibodies and their subclasses or monoclonal antibodies. Antibodies against lipopolysaccharides, lipoarabinomannan, peptidoglycans, teichoic acid derivatives, extra-cellular polysaccharides and lipid A are preferred.

By use of the support materials according to the invention and application of the process according to the invention the cytokinine formation induced by parodontitis exciters can be diagnosed with polyclonal antibodies and their subclasses or monoclonal antibodies. Antibodies against the interleukines IL-1, IL-2, IL-3, IL-4, IL-5, IL-6, IL-7, IL-8, tumour necrosis factor TNFα, interferons α,β,γ, colony-forming factors M-CSF, growth factors EGF, TGFα and chemokines MCP can be used.

By use of the support materials according to the invention and application of the process according to the invention, the destruction of the parodontal tissue by the enzyme activity of alkaline phosphatase, arylsulphatase, aspartataminotransferase, β-glucuronidase, cathepsins (G, B, D), elastase, hyaluronidase, lactate-dehydrogenase, lysocyme, matrix metal proteinases

(collagenases, gelatinases), tissue inhibitor metal proteinases (TIMP), stomelysin, lactoferrin, tryptase and myeloperoxidase can be diagnosed.

By use of the support material according to the invention and application of the processes according to the invention the molecular markers for gingivitis can be diagnosed with polyclonal antibodies and their subclasses or monoclonal antibodies. These include cytokines, for example interleukines IL-1, IL-2, IL-4, IL-6, TNFα and arachidoic acid derivatives, for example prostaglandin E_2.

Caries is causally connected with infection by Streptococcus salivarius salivarius, Streptococcus vestibularis, Streptococcus thermophilus, Streptococcus mutans, Streptococcus rattus, Streptococcus sobrinus, Streptococcus cricetus, Streptococcus downei, Streptococcus macacae, Streptococcus ferus, Streptococcus milleri, Streptococcus anginosus, Streptococcus constellatus, Streptococcus intermedius, Streptococcus mitis, Streptococcus oralis, Streptococcus sanguis, Streptococcus gordonii, Streptococcus parasanguis, Streptococcus crista, Streptococcus mitior, Lactobacillus acidophilus, Lactobacillus alimentarius, Lactobacillus brevis, Lactobacillus buchneri, Lactobacillus casei, Lactobacillus paracasei ss paracasei, Lactobacillus paracasei ss rhamnosus, Lactobacillus paracasei ss tolerans, Lactobacillus delbrueckii, Lactobacillus delbrueckii ss lactis, Lactobacillus delbrueckii ss delbrueckii, Lactobacillus delbrueckii ss bulgaricus, Lactobacillus endocarditis, Lactobacillus fermentum, Lactobacillus gasseri, Lactobacillus pseudoplantarum, Lactobacillus rhamnosus, Lactobacillus salivarius, Actinomyces israelii, Actinomyces odontolyticus, Actinomyces actinomycetemcomitans, Eikenella, Branhamella catarrhalis, Veillonella alcalescens, Veillonella parvula, Actinomyces naeslundii, Rothia dentocariosa. By use of the support materials according to the invention and application of the process according to the invention the presence and the amount of cariogenic bacteria can be diagnosed with polyclonal antibodies and their subclasses or monoclonal antibodies, which are directed against the different surface antigens of these bacteria, for example proteins, lipopolysaccharides, glycoproteins, fimbriae, extracellular polysaccharides,

adhesins, lipoteichoic acid derivatives, glucan-binding proteins, and collagen-binding proteins.

By use of the support materials according to the invention and application of the process according to the invention extra-cellular enzyme activity of cariogenic bacteria can be diagnosed, for example proteases, preferably glucosyltransferases, glucanase, fructosyltransferase, fructanase.

By use of the support materials according to the invention and application of the process according to the invention metabolic products of cariogenic bacteria can be diagnosed, for example butyric acid, formic acid, preferably acetic acid, propionic acid, and particularly preferably lactic acid. The acidification of the surrounding environment which accompanies acid release can in addition be detected using pH indicators, for example bromo phenol blue, Congo red, bromo cresol blue, preferably rhodol derivatives, particularly preferably Oregon green derivatives. As a result of the acidification of the pH in the surrounding environment, such as plaque, calcium ions are released from the hard dental substance. By use of the support materials according to the invention and application of the process according to the invention, this process can be diagnosed using calcium indicators, for example calcium crimson, preferably calcium green, calcium orange, and particularly preferably calcium Oregon green 488 BAPTA.

By use of the support materials according to the invention and application of the process according to the invention, the increase or decrease in the abovementioned marker compounds can be used as a measure of the healing process.

The list of the marker compounds is given by way of example and does not limit the invention.

It is surprising that in spite of the dynamic processes taking place in the oral cavity, which are subject to a constant exchange of fluid due to the secretions of the salivary glands and the sulcus fluid, sufficiently high concentrations of

marker compounds are obtained on the surfaces of the support materials according to the invention or in the support materials, which allow a safe diagnosis to be made within the framework of routine treatments.

It is advantageous that by using the support materials according to the invention or by application of the process according to the invention, an almost complete situation description of the oral cavity is possible without a large number of individual samples, as is archiving of the present clinical picture, with the use of addition-cross-linking silicon impression materials being of particular interest, as the impressions can be kept practically indefinitely. If necessary, for the purpose of archiving the present clinical picture, the impressions can also be recorded by means of photography, digital cameras, UV-VIS/fluorescence scanners and evaluated by means of image documentation software.

In addition it is advantageous that by using the support material according to the invention and application of the process according to the invention an almost compete situation description of the individual teeth is possible without a large number of individual samples, as is archiving of the present clinical picture. Besides occlusal chewing surfaces and vestibular, lingual, coronal, apical, cervical, gingival, incisal areas of a tooth, the interproximal areas between the teeth are also recorded by the marking definition of the support materials.

It is also advantageous that by use of the support materials according to the invention or the process according to the invention, fluid from the gingival pockets can if necessary be collected and taken for locus- and substance-specific diagnosis. An almost complete situation description of the individual parodontal pockets is thus possible without a large number of individual samples, as is archiving of the present clinical picture.

It is above all advantageous that the locus- and substance-specific intraoral diagnosis takes place in such a way that the diagnostically useful additives do not burden the patient because the emission of the diagnostically useful

additives is avoided. The diagnostically useful additives are not modification substances which modify the processes occurring intraorally. Repeated use of the locus- and substance-specific intraoral diagnosis to monitor the treatment process is thus made possible.

It is furthermore advantageous that by use of the support materials according to the invention or the process according to the invention the time-consuming cultivation or incubation of pathogenic microorganisms is dispensed with, and thus the risk connected with the multiplication of pathogenic germs is also minimised. A particularly great advantage of the method according to the invention is that detection also succeeds if the concentrations of the substances to be detected in the imaging material are very low.

In addition it is advantageous that the diagnosis result from the impression can if necessary be transferred to a positive impression. This is possible for example with plaster, hydrogels, model silicons or similar substances. Assignment of the diagnosis signals in the impression to individual teeth is thus facilitated.

With the support materials according to the invention direct locus- and substance-specific detection of microorganisms on the teeth also succeeds without having to cultivate or incubate the microorganisms adhering to the support material. This means that it is not necessary, for example, to add nutrients to the support material, as described in US-A-4 976 951.

Equally advantageous is the simplicity of the processes described, which, in the case of many diseases allows problem-free early recognition or early diagnosis at low cost, and without considerable additional expense to the therapist and the patient.

As support material, dental impression materials or films, each based on silicon, polyether-silicon, polyether, alginate or hydrocolloid can for example be considered. For some application areas, such as the diagnosis of caries, alginates, preferably without the addition of phosphates or pyrophosphates

are used. Equally suitable as support materials are all other known plastics, for example polyethylenes, polypropylenes, poly(meth)acrylates, polyurethanes, polycarbonates, polysulphide, polyvinylchlorides or rubber. Moreover, hydrogels, for example polyvinylpyrrolidone- or polyvinylalcohol-based, are suitable as support material. Also suitable for carrying out the process according to the invention are dental plaster preparations, non-curable plastic compositions such as kneading masses or solid dispersions in liquids, for example pastes and similar masses of silicon, waxes, gelatine, starch, fats and the above named support materials.

The basis of many impression materials is formed by addition-cross-linking or condensation-cross-linking silicons, polyether silicons or polyethers. These materials have been described extensively in the state of the art, so it is superfluous to go into them in more detail here. Addition- or condensation-cross-linking silicons are for example described in US-A-3 897 376, in EP-B-0 231 420 as well as in US-A-4 035 453 which is mentioned there on page 3, and also in EP-A-0 480 238 (see in particular page 2, lines 3-26) and in EP-B-0 268 347. The disclosure of these documents should be included here by means of reference. Polyether silicons are described for example in DE-A-37 41 575 as well as in DE-A-38 38 587, among others, the disclosure of which should also be included here. Polyethers are described for example in DE-B-17 45 810, DE-A-43 06 997, DE-A-40 93 555, DE-C-25 15 593, DE-A-197 19 438 and US-A-34 53 242, the disclosure of which should likewise be included here. Impression materials based on N-alkylaziridinopolyether are preferred.

Support materials based on polyether are particularly suitable. The compounds include for example the following components:

(A) 30 to 96.9999, preferably 40 to 88.99, particularly preferably 45 to 80.49 wt.-% of at least one N-alkylaziridinopolyether with a molecular mass in the range of 1,000 to 20,000 g/mol and an aziridino equivalent mass in the range of 500 to 8,000 g/equivalent.

(B) 1 to 10, preferably 1 to 5, particularly preferably 1.5 to 3 wt.-% starter substances, which are suitable to effect the curing of the N-alkylaziridinopolyethers,

(C) 1 to 50, preferably 5 to 45, particularly preferably 8 to 43 wt.-% organic diluting agents,

(D) 1 to 50, preferably 5 to 40, particularly preferably 10 to 30 wt.-% modifiers, including fillers, dyes, pigments, thixotropes, flow improvers, polymeric thickeners, surfactants, fragrances, and flavourings,

(E) 0.0001 to 10 wt.-%, preferably 0.01 to 1 wt.-% diagnostic additives.

Component (A) includes N-alkylaziridinopolyether, in which the polyether basic substances can be homopolymers of ethylene oxide, propylene oxide or tetrahydrofurane, statistic co- and terpolymers of the named monomers and/or block copolymers of ethylene oxide and propylene oxide.

Such starter substances according to component (B) are suitable for use in two-component impression materials, which facilitate curing of the mixed preparation into an elastic solid body within a period of 1 to 20 minutes, this solid body meeting the requirements of an elastic impression material according to DIN/EN 2482 and having a Shore A hardness (DIN 53505) of at least 20 after 24 hours storage time.

Many of the known starters can be used as starters of the catalyst components. Expedient use is made of such starters or starter systems which allow simple adjustment of the curing process, produce no side effects and make it possible to reproduce the mechanical properties at the required level.

In DE-C-914 325 the use of oxonium, ammonium and sulphonium salts as starter substances is suggested.

A summary representation of the starter substances used for the curing of N-alkylaziridino compounds is contained in O.C. DERMER, G. E. HAM, "Ethylenimines and other Aziridines" Academic Press (1969).

A large number of compound classes and compounds have accordingly proved to be suitable in principle as polymerisation triggers. In the practical application of the cationic polymerisation of aziridinopolyethers, it is however very difficult to adjust the desired setting process with a sufficiently long processing time and rapid final curing. This aim can be achieved by the use of special trialkylsulphonium salts as described for example in EP-A-0 110 429.

By using special trisalkylsulphonium salts, the criteria of the curing speed and the properties of the elastic solid body can in principle be achieved.

In the patent application DE-A-100 18 918 starters are described which give the catalyst component only a low acid level and allow an easily adjustable, relatively long processing time after mixing of the basic components and catalyst components has been carried out.

Starter systems of this type are suitable for curing the base pastes at the necessary speed. By using these the desired properties of the elastic solid body can be achieved.

Patent application DE-A-199 42 459 describes elastomeric materials with improved catalyst components which are characterized by increased extensibility. According to this invention boric acid complexes are used as starters. These starters have proved their worth particularly for curing of N-alkylaziridinopolyethers.

As organic diluting agents, corresponding to component (C), polyetherpolyols, such as polypropylene glycols or mixed polyetherols with tetrahydrofurane and/or ethylene oxide and/or propylene oxide units, polyester polyols, such as polycaprolactondiols and polycaprolactontriols, polycarbonate diols, aliphatic esters, oils, fats, waxes, aliphatic hydrocarbons, araliphatic hydrocarbons as well as mono- or polyfunctional esters of multivalent acids, such as phthalic acid or citric acid or esters or amides of alkylsulphonic acids and arylsulphonic acids are used.

The modifiers according to component (D) are mostly fine fillers, such as alumosilicates, precipitation silicic acids, silica dust, wollastonite, mica dust and diatomaceous earth, as well as dyes and pigments, the addition of which allows better assessment of the mixture quality and reduces the danger of confusion, thixotropes, such as finely dispersed silicic acids and other additives influencing flow behaviour, such as polymeric thickeners, and also surfactants for adjustment of the flow behaviour as well as fragrances and flavourings.

A further possible support material can also be a polymerisable liquid or a solution of a polymeric substance, which is sprayed or applied, for example painted, onto the places to be examined. Typically, this involves nitrocellulose-based paints with a volatile solvent as well as optionally further auxiliaries which cure to form a solid layer which can be removed from the substrate after absorption of the marker compound. In general, all polymers can be used which can be dissolved in suitable slightly volatile solvents. The use of polyurethanes in acetone is for example known. Suitable film-forming systems are sufficiently known from paints and varnish chemistry.

Firstly, the support material according to the invention can intraorally, locus-specifically absorb the marker compound to be examined. The marker compound is detected, quantified or diagnostically evaluated on or in the support material locus- and substance-specifically in a subsequent procedure, with the marker compound also being able to be formed only as the result of a catalytic, chemical, or biochemical reaction. The marker compound to be analysed can for example be locally fixed on or in the support material by means of ionic, polar, nonpolar or hydrophobic interactions. The formation of microstructures and/or micro-spaces in the support materials, for example in the form of foams, can support the absorption and fixing of the marker compounds to be examined.

In a preferred embodiment, the support material contains at least one component or, to simplify the diagnostic procedure, all the necessary components of the diagnostic test system. These diagnostic additives can for

example be locally fixed on or in the support material by means of ionic, polar, nonpolar or hydrophobic interactions. A local fixing of diagnostic additives is also made possible by the fact that the diagnostic additives are first fixed on high-molecular carriers and then kneaded into the support material. By this means the diffusion movement of the diagnostic additives in the support material is controlled. The formation of microstructures and/or micro-spaces in the support materials, for example in the form of foams, can support the absorption and fixing of the components. The components can be freely available in the support materials according to the invention, or be present in another phase.

The support materials according to the invention contain 0.0001 to 10 wt.-%, preferably 0.01 to 1 wt.-% diagnostic additives, however at least so many additives that the desired effect can be observed. In the case of application of the process according to the invention, diagnostic additives have to be applied to the support materials in such a quantity that the desired effect can be observed.

Desired effects can all be observable signals. These include, for example, colour signals, for example fluorescent, UV, VIS, phosphorescent or luminescent signals, which if necessary have to be detected with special equipment. Likewise, application of the process according to the invention can produce signals which can be observed by means of thermography, spectroscopy, chromatography, or by analysis of changes in the topography of the support materials.

Examples of diagnostic additives are, without meaning the following list to be understood as limiting the present invention:

- dye indicators, for example pH indicators, such as bromo phenol blue, Congo red, bromo cresol green, Oregon green derivatives, rhodol derivatives, redox indicators, such as methylene blue, 5-cyano-2,3-ditolyltetrazolium chloride (CTC), 2-(4-iodophenyl)-3-(4-nitrophenyl)-5-phenyl-2H-tetrazolium chloride (INT), 8-

dimethylamino-2,3-benzophenoxazine (Meldola's blue), 1-methoxyphenazine methosulphate (MPMS), 5-(3-carboxymethoxyphenyl)-2-(4,5-dimethylthiazolyl)-3-(4-sulphophenyl)tetrazolium (MTS), 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT), 3,3'-(3,3'-dimethoxy-4,4'-biphenylene)-bis[2-(4-nitrophenyl-5-phenyl)]-2H-tetrazolium chloride (NBT), nitrotetrazolium violet (NTV), phenazinmethosulphate (PMS), sodium-3'-[1-[(phenylamino)carbonyl]-3,4-tetrazolium]bis(4-methoxy-6-nitro)benzenesulphonic acid (XTT), phenazinethosulphate (PES), WST-1)

- Fluorescence indicators, for example Oregon green 488 BAPTA, calcium green, calcium orange, calcium crimson,
- Chemoluminescence indicators,
- Vitality indicators, for example 5-bromo-2'-deoxyuridine,
- Other dye indicators, for example p-nitroaniline derivatives, 2-naphthylamine derivatives, 7-amino-4-methylcoumarin derivatives, 7-amino-4-chloromethylcoumarin derivatives, 6-aminoquinoline derivatives, rhodamine derivatives, 5,5'-dithiobis-(2-nitrobenzoic acid), monobrombiman derivatives, tetramethylrhodamine derivatives, eosine derivatives, erythrosine derivatives, Texas red derivatives, coumarin derivatives, pyridyloxauzol derivatives, benzofurazan derivatives, naphthaline derivatives, didansyl cysteines, dansyl derivatives, aziridine derivatives, pyrene derivatives, Coomassie blue)

Moreover, the indicator substances can for example be covalently bound to enzymes, proteins, glycoproteins, lipopolysaccharides, polysaccharides, polyclonal and monoclonal antibodies, DNA, RNA cell organelles or microorganisms.

By diagnostic additives are also meant antibodies which are directed against marker compounds, such as polyclonal antibodies and their subclasses, and monoclonal antibodies. Moreover, the antibodies can be covalently bound for

example to enzymes, proteins, glycoproteins, lipopolysaccharides, polysaccharides, DNA, RNA, cell organelles, microorganisms or other support materials.

Diagnostic additives can be enzymes of the following classes, the following list being by way of example, and not limiting the invention:

- Oxidoreductases and their subclasses, for example dehydrogenases, such as lactate dehydrogenase, oxidases, peroxidases, reductases, monooxygenases, dioxygenases;
- transferases and their subclasses, for example C_1-transferases, glycosyl transferases, such as glusoyltransferases, fructosyltransferases, aminotransferases, phospho-transferases;
- hydrolases and their subclasses, for example esterases, glycosidases such as glucanase, fructanase, peptidases, for example dipeptidylpeptidases, Arg-gingipain, Lys-gingipain, collagenases, gelatinases, cathepsines, elastases, amidases,
- Lyases and their subclasses, for example C-C-lyases, C-O-lyases, C-N-lyases, C-S-lyases,
- Isomerases and their subclasses, for example epimerases, cis-trans-isomerases, intramolecular transferases;
- Ligases and their subclasses, for example C-C-ligases, C-O-ligases, C-N-ligases, C-S-ligases.

2000 different enzymes are known today. A system has been developed for their classification which takes effect- and substrate-specificity into account. According to this, specific substrates and/or coenzymes (NAD(P), NAD(P)H, FAD, FMN, liponamide, ubiquinon, heme, ATP, ADP, AMP, GTP, GDP, GMP, UTP, UDP, UMP, CTP, CDP, CMP, coenzyme A, thiamindiphosphate, pyridoxalphosphate, biotin and tetrahydrofolate belong to each enzyme. These specific substrates and/or coenzymes have to be present as diagnostic additives if for example one or more enzymes serve as a marker substance. Conversely, it is of course true that specific enzymes can be used as

diagnostic additives if specific substrates, for example sugar phosphates, lactic acid/lactate, pyruvate, acetic acid/acetate, propionic acid/propionate, formic acid/formiate, peptides and synthetic peptides serve as marker substances.

In addition the enzymes can be covalently bound to the support material.

Diagnostic additives can also be substances which have to be present concomitantly, in order to be able to diagnose the marker substances. Such substances include:

- Buffers, for example sodium phosphate, sodium hydrogen phosphate, sodium dihydrogen phosphate, potassium phosphate, potassium hydrogen phosphate, potassium dihydrogen phosphate, sodium pyrrophosphate, sodium carbonate, potassium carbonate, sodium hydrogen carbonate, potassium hydrogen carbonate, sodium tetraborate, acetic acid/acetate, citric acid/citrate, diethylbarbituric acid, tris(hydroxymethyl)aminomethane (TRIS), glycine, glycylglycine, N-(2-acetamido)-2-aminoethane sulphonic acid (ACES), N-(2-acetamido)iminodiacetate (ADA), N,N-bis(2-hydroxyethyl)-2-aminoethane sulphonic acid (BES), N,N-bis(2-hydroxyethyl)glycine (BICINE), 2,2-bis-(hydroxyethyl)-iminotris(hydroxymethyl)methane (BIS-TRIS), 2-(cyclohexylamino)ethane sulphonic acid (CHES), 2-[4-(2-hydroxyethyl-1-piperazine)]ethane sulphonic acid (HEPES), 3-[4-(2-hydroxyethyl-1-piperazinyl)]propane sulphonic acid (HEPPS), 2-morpholinoethane sulphonic acid (MES), 3-morpholinopropane sulphonic acid (MOPS), piperazine-1,4-bis(2-ethane sulphonic acid (PIPES), N-[tris(hydroxymethyl)-methyl]-2-aminoethane sulphonic acid (TES), N-[tris(hydroxymethyl)-methyl]-glycine (TRICINE);
- Acids, for example sulphuric acid, sulphurous acid, phosphoric acid, hydrochloric acid, acetic acid, nitric acid;
- Bases, for example sodium hydroxide, potassium hydroxide, lithium hydroxide, ammonia, calcium hydroxide, magnesium oxide;

- Solvents, for example water, methanol, ethanol, isopropanol, propanol, glycerine, dimethylsulphoxide, tetrahydrofuran, acetone, butanone, cyclohexane, toluene, methylene chloride, chloroform, alkanes, acetic acid ethyl esters;
- Salts, for example magnesium chloride, magnesium sulphate, magnesium nitrate, calcium chloride, calcium sulphate, calcium nitrate, ferric (III) chloride, ferric (II) chloride, zinc chloride, zinc sulphate, nickel chloride, manganese chloride, ammonium sulphate, sodium sulphate, sodium chloride, potassium chloride, sodium phosphates, potassium phosphates;
- Other substances, for example glutathione, bovine serum albumin, sucrose, glucose, fructose, trehalose, polyethylene glycol, polyvinylpyrrolidone, hydrogen peroxide.

In a special embodiment of the invention, the diagnostic additives can be present in micro-encapsulated form. A number of molecules of diagnostic additives can be included in one microcapsule. The potentiating effect that occurs when micro-encapsulated diagnostic substances are used is a particular advantage.

Generally, when using multicomponent diagnostic systems according to the invention, i.e. systems in which the components necessary for detection are stored in several components, the individual components can be present separated from one another, but in each case enclosed in microcapsules, or even partly micro-encapsulated and partly free. Of course it also possible, with diagnosis systems involving more than two components, for at least two components in each case to be micro-encapsulated and for at least one other component to be kept available free in the support material. In each case it is essential only that a reaction of the diagnostic additives for the desired end product is prevented by keeping the individual components separate until one reaction partner is released by destruction of the microcapsule wall.

As impression materials are normally available as two components, it can be advantageous to keep different components of the active ingredients in different components of the impression materials, namely the base and the catalyst paste, microcapsulated or free.

When choosing suitable support materials care must generally be taken that these are compatible with the diagnostic substances. For example when using fluorescent dyes, naturally the support materials must not contain components which are themselves fluorescent in the relevant wave length range. The requirement for inert support materials for diagnostic purposes is self-evident to the person skilled in the art and can be borne in mind by the person skilled in the art without problems.

The invention is explained below in more detail by means of examples, without these limiting it in any way.

Application example 1

Detection of Arg-gingipain via a polyether impression material

A base paste was prepared in a standard laboratory three-fingered kneader, 53.2 parts by weight of an aziridinopolyether obtained according to Example 12 of DE-PS-17 45 810 being mixed with 18.1 g of a hydrogenated palm oil and 6.4 parts by weight dibenzyl toluene for the sake of homogeneity. This mass was combined with 11.8 parts of a copolymer of ethylene oxide and tetramethylene oxide units of an average molar mass of 6500, as well as 0.1 parts laurylimidazol and 5.0 parts of a block copolymer of ethylene oxide and propylene oxide units with an average molecular mass of 3500. This mass was then mixed with 5.3 parts by weight diatomaceous earth.

A catalyst paste was mixed by homogenisation of 33.8 parts by weight acetyltributylcitrate with 14.1 parts ethylene oxide-propylene oxide block copolymer and 19.0 parts of a sulphonium salt which was obtained according to Example 31 of DE-PS-25 15 593. This mass was combined with 11 parts

diatomaceous earth and 20.5 parts pyrogenic silicic acid as well as 1 part titanium dioxide. Then 0.7 g tris(hydroxymethyl)aminomethane, 0.8 g glycylgycine and 200 µg N-t-Boc-Val-Pro-Arg-7-amido-4-methyl-coumarin were added as buffers.

Base and catalyst pastes were mixed in a volume ratio 5:1 and cured after approx. 8 minutes to produce a homogenous rubber. Doping of the surface of this rubber during the setting period with 2 µl Arg-gingipain-containing solution (original solution: 0.5 mg/ml Arg-gingipain in 200 mM tris(hydroxymethyl)aminomethane pH 7.6) resulted after a few minutes in an intense blue fluorescence emission at this point, at an excitation wave length of 360 nm.

Application example 2

Detection of Arg-gingipain on alginate test pieces

20 ml solution containing 0.12 g tris(hydroxymethyl)aminomethane, 100 µg N-t-Boc-Val-Pro-Arg-7-amido-4-methylcoumarin, pH 7.6 were added to 10 g alginate (Palgat Plus Quick, ESPE Dental AG) and kneaded with a broad plastic spatula to produce a homogenous paste within 1 minute. During the setting period the alginate test piece was doped with 2 µl Arg-gingipain-containing solution (original solution: 0.5 mg/ml Arg-gingipain in 200 mM tris(hydroxymethyl)aminomethane, pH 7.6). After 5 minutes, an intense blue fluorescent emission could be observed at this point, at an excitation wave length of 360 nm.

Application example 3

Detection of Arg-gingipain via an aliginate impression material in gingival pockets

40 ml solution containing 0.24 g tris(hydroxymethyl)aminomethane, 0.26 g glycylglycin, 200 µm N-t-Boc-Pro-Arg-7-amido-4-methylcoumarin was added

to 20 g alginate (Palgat Plus Quick, ESPE Dental AG) and kneaded with a broad plastic spatula to produce a homogenous mass within 1 minute. The alginate mass was placed in a commercially available impression tray and placed on the upper and lower jaw of a parodontitis patient for 5 minutes. Intense blue fluorescence emissions could be observed on individual gingival pocket edges at an excitation wave length of 360 nm.

Application example 4

Detection of lactic acid on alginate test pieces

10 ml solution containing 0.065 g glycylglycin, 0.06 g tris(hydroxymethyl)aminomethane, 9 mg NAD, 0.23 mg phenazine methosulphate, 0.75 mg 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT), and 463 units lactate dehydrogenase from pig's heart was added to 5 g alginate and kneaded with a broad spatula to produce a homogenous mass within 1 minute. The alginate test pieces were doped with 5 µl of a 10 mM calactate solution in 100 mM tris(hydroxymethyl)amino-methane, pH 9.0. After 4 minutes the development of a blue coloration could be observed at the doping point.

Application example 5

Determination of lactic acid formation on teeth by means of an alginate impression material

40 ml solution containing 0.26 g glycylglycin, 0.24 g tris(hydroxymethyl)aminomethane, 36 mg NAD, 0.9 mg phenazine methosulphate, 3 mg 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT), and 1850 units lactate dehydrogenase from pig's heart was added to 20 g alginate and kneaded with a broad spatula to produce a homogenous mass within 1 minute. The alginate mass was placed in a commercially available impression tray and placed on the upper and lower jaw of a patient. The patient was supposed to have cleaned his teeth beforehand,

rinsing with a 1% sucrose solution. After 4 minutes the impression tray was removed. Places where there was lactic acid formation could be identified from the blue coloration developing.

Claims

1. Deformable, curable or film-forming support material, characterized in that it contains diagnostically useful additives for locus-specific and substance-specific intraoral diagnosis, which lead to a diagnostic result without a cultivation step.

2. Support material according to Claim 1, characterized in that it contains diagnostically useful additives for intraoral locus-specific detection of pathogenic substances and/or microorganisms or for intraoral locus-specific detection of substances that indicate mouth diseases or healing processes.

3. Support material according to any one of Claims 1 or 2, characterized in that the diagnostically useful additives are present in micro-encapsulated form.

4. Support material according to any one of Claims 1 to 3, characterized in that at least enough diagnostic additives are contained to enable a diagnostic signal to be observed.

5. Support material according to any one of Claims 1 to 4, characterized in that the diagnostic additives are contained in a quantity of 0.0001 to 10 wt.-%, preferably 0.01 to 1 wt.-%.

6. Support material for use according to any one of Claims 1 to 5, characterized in that it is selected from one of the following groups:

   (i) impression materials or films based on silicon, polyether-silicon, polyether, alginate or hydrocolloid,

   (ii) plastics from the group polyethylenes, polypropylenes, poly(meth)acrylates, polyurethanes, polycarbonates, polysulphide, polyvinylchlorides or rubber,

(iii) hydrogels based on polyvinylpyrrolidone or polyvinylalcohol, or

(iv) dental plaster preparations.

7. Support material according to Claim 6, characterized in that it is an impression material based on N-alkylaziridinopolyether.

8. Support material according to Claim 7, characterized in that it includes:

(A) 30 to 96.9999 wt.-% of at least one N-alkylaziridinopolyether with a molecular mass in the range of 1,000 to 20,000 g/mol and an aziridino equivalent mass in the range of 500 to 8,000 g/equivalent.

(B) 1 to 10 wt.-% starter substances, which are suitable to effect the curing of the N-alkylaziridinopolyethers,

(C) 1 to 50 wt.-% organic diluting agents,

(D) 1 to 50 wt.-% modifiers, including fillers, dyes, pigments, thixotropes, flow improvers, polymeric thickeners, surfactants, fragrances, and flavourings,

(E) 0.0001 to 10 wt.-% diagnostic additives.

9. Process for the preparation of images for intraoral locus- and substance-specific diagnostic purposes, characterized in that diagnostically useful additives are applied to deformable, curable or film-forming support materials containing no diagnostically useful additives, in such a quantity that a diagnostic signal can be observed, with the additives leading to a diagnostic result without a cultivation step.

10. Process according to Claim 9, characterized in that diagnostically useful additives are applied to deformable, curable or film-forming support materials containing no diagnostically useful additives, in such a quantity that a diagnostic signal in the form of the intraoral locus- and substance-specific detection of pathogenic substances and/or of microorganisms or in the form of intraoral locus- and substance-specific detection of

substances which indicate mouth diseases or healing processes can be observed.

11. Process according to any one of Claims 9 or 10, characterized in that the diagnostically useful additives are present in micro-encapsulated form.

12. Process according to any one of Claims 9 to 11, characterized in that the diagnostically useful additives are used in a quantity of 0.0001 to 10 wt.-%, preferably 0.01 to 1 wt.-%.

13. Process according to any one of Claims 9 to 12, characterized in that the support material is selected from one of the following groups:

(i) impression materials or films based on silicon, polyether-silicon, polyether, alginate or hydrocolloid,
(ii) plastics from the group polyethylenes, polypropylenes, poly(meth)acrylates, polyurethanes, polycarbonates, polysulphide, polyvinylchlorides or rubber.
(iii) hydrogels based on polyvinylpyrrolidone or polyvinylalcohol, or
(iv) dental plaster preparations.

14. Process according to Claim 13, characterized in that an impression material based on N-alkylaziridinopolyether is selected as support material.

15. Method according to Claim 14, characterized in that the support material includes:

(A) 30 to 96.9999 wt.-% of at least one N-alkylaziridinopolyether with a molecular mass in the range of 1,000 to 20,000 g/mol and an aziridino equivalent mass in the range of 500 to 8,000 g/equivalent.
(B) 1 to 10 wt.-% starter substances, which are suitable to effect the curing of the N-alkylaziridinopolyethers,
(C) 1 to 50 wt.-% organic diluting agents,

(D) 1 to 50 wt.-% modifiers, including fillers, dyes, pigments, thixotropes, flow improvers, polymeric thickeners, surfactants, fragrances, and flavourings,

(E) 0.0001 to 10 wt.-% diagnostic additives.

16. Process for simultaneous multiple as well as locus- and substance-specific intraoral investigation, including the steps: Taking of impression with deformable, curable or film-forming support material, which contains diagnostically effective additives, and if necessary application of further diagnostically effective additives, or taking of impression with deformable, curable or film-forming support material, which contains no diagnostically effective additives, and application of diagnostically effective additives.

Attorney Docket No. 0475-0198P

BIRCH, STEWART, KOLASCH & BIRCH, LLP
P.O. Box 747 • Falls Church, Virginia 22040-0747
Telephone: (703) 205-8000 • Facsimile: (703) 205-8050

PLEASE NOTE: YOU MUST COMPLETE THE FOLLOWING

COMBINED DECLARATION AND POWER OF ATTORNEY FOR PATENT AND DESIGN APPLICATIONS

As a below named inventor, I hereby declare that: my residence, post office address and citizenship are as stated next to my name; that I verily believe that I am the original, first and sole inventor (if only one inventor is named below) or an original, first and joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Insert Title: SUPPORT MATERIAL AND IMAGING METHOD FOR INTRAORAL DIAGNOSTIC PURPOSES

Fill in Appropriate Information - For Use Without Specification Attached:

the specification of which is attached hereto. If not attached hereto,
the specification was filed on _____ as
United States Application Number _____;
and amended on _____ (if applicable) and/or
the specification was filed on June 13, 2000 as PCT
International Application Number PCT/EP00/05418; and was
amended under PCT Article 19 on _____ (if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I do not know and do not believe the same was ever known or used in the United States of America before my or our invention thereof, or patented or described in any printed publication in any country before my or our invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representative or assigns more than twelve months (six months for designs) prior to this application, and that no application for patent or inventor's certificate on this invention has been filed in any country foreign to the United States of America prior to this application by me or my legal representatives or assigns, except as follows.

I hereby claim foreign priority benefits under Title 35, United States Code, §119(a)-(d) of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Insert Priority Information: (if appropriate)

Prior Foreign Application(s)			Priority Claimed	
199 26 728.6 (Number)	Germany (Country)	June 11, 1999 (Month/Day/Year Filed)	☒ Yes	☐ No
(Number)	(Country)	(Month/Day/Year Filed)	☐ Yes	☐ No
(Number)	(Country)	(Month/Day/Year Filed)	☐ Yes	☐ No
(Number)	(Country)	(Month/Day/Year Filed)	☐ Yes	☐ No

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional applications(s) listed below.

Insert Provisional Application(s): (if any)

(Application Number)	(Filing Date)
(Application Number)	(Filing Date)

All Foreign Applications, if any, for any Patent or Inventor's Certificate Filed More than 12 Months (6 Months for Designs) Prior to the Filing Date of This Application:

Insert Requested Information: (if appropriate)

Country	Application Number	Date of Filing (Month/Day/Year)

I hereby claim the benefit under Title 35, United States Code, §120 of any United States and/or PCT application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States and/or PCT application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information which is material to the patentability as defined in Title 37, Code of Federal Regulations, §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

Insert Prior U.S. Application(s): (if any)

(Application Number)	(Filing Date)	(Status - patented, pending, abandoned)
(Application Number)	(Filing Date)	(Status - patented, pending, abandoned)

Attorney Docket No. 0475-0198P

I hereby appoint the practitioners at CUSTOMER NO. 2292 as my attorneys or agents to prosecute this application and/or an international application based on this application and to transact all business in the United States Patent and Trademark Office connected therewith and in connection with the resulting patent based on instructions received from the entity who first sent the application papers to the practitioners, unless the inventor(s) or assignee provides said practitioners with a written notice to the contrary:

Send Correspondence to:

BIRCH, STEWART, KOLASCH & BIRCH, LLP or CUSTOMER NO. 2292
P.O. Box 747 • Falls Church, Virginia 22040-0747
Telephone: (703) 205-8000 • Facsimile: (703) 205-8050

PLEASE NOTE: YOU MUST COMPLETE THE FOLLOWING:

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of First or Sole Inventor. Insert Name of Inventor. Insert Date This Document is Signed

GIVEN NAME/FAMILY NAME	INVENTOR'S SIGNATURE	DATE*
Oswald GASSER 1-00	Oswald Gasser	Dec. 5, 2001
Residence (City, State & Country)		CITIZENSHIP
Seefeld GERMANY DEX		German
MAILING ADDRESS (Complete Street Address including City, State & Country)		
Höhenstrasse 10, D-82229 Seefeld GERMANY		

Insert Residence. Insert Citizenship

Insert Post Office Address

Full Name of Second Inventor, if any. see above

GIVEN NAME/FAMILY NAME	INVENTOR'S SIGNATURE	DATE*
Rainer GUGGENBERGER 2-00		Dec 5, 2001
Residence (City, State & Country)		CITIZENSHIP
Herrsching GERMANY DEX		German
MAILING ADDRESS (Complete Street Address including City, State & Country)		
Kienbachstrasse 2b, D-82211 Herrsching GERMANY		

Full Name of Third Inventor, if any. see above

GIVEN NAME/FAMILY NAME	INVENTOR'S SIGNATURE	DATE*
Bernd GANGNUS 3-00		Dec 6, 2001
Residence (City, State & Country)		CITIZENSHIP
Andechs GERMANY DEX		German
MAILING ADDRESS (Complete Street Address including City, State & Country)		
Moosweg 2b, D-82346 Andechs GERMANY		

Full Name of Fourth Inventor, if any. see above

GIVEN NAME/FAMILY NAME	INVENTOR'S SIGNATURE	DATE*
Ingo HÄBERLEIN 4-00	Ingo Häberlein	Dec 6, 2001
Residence (City, State & Country)		CITIZENSHIP
Weilheim GERMANY DEX		German
MAILING ADDRESS (Complete Street Address including City, State & Country)		
Eichweide 3, D-82362 Weilheim GERMANY		

Full Name of Fifth Inventor, if any. see above

GIVEN NAME/FAMILY NAME	INVENTOR'S SIGNATURE	DATE*
Residence (City, State & Country)		CITIZENSHIP
MAILING ADDRESS (Complete Street Address including City, State & Country)		

Full Name of Sixth Inventor, if any. see above

GIVEN NAME/FAMILY NAME	INVENTOR'S SIGNATURE	DATE*
Residence (City, State & Country)		CITIZENSHIP
MAILING ADDRESS (Complete Street Address including City, State & Country)		

*DATE OF SIGNATURE